

Serial No.: 09/881,771

Attorney Docket No: MCS-004-01

**REMARKS**

In response to the final Office Action dated October 20, 2005, claims 1, 11, 18, 24 and 25 have been amended. Therefore, claims 1, 3-5, 7-25 and 27 remain in the case. The Applicants respectfully request that this amendment be entered under 37 C.F.R. 1.116 to place the above-referenced application in condition for allowance or, alternatively, in better condition for appeal. Reexamination and reconsideration of the amended application are requested.

**Section 112, second paragraph Rejections**

The Office Action rejected claims 1, 3-5, 7-10, 25, and 27 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly and distinctly claim the subject matter that the Applicants regard as the invention. In particular, the Office Action maintains that the term "longer length" in claims 1, 11, 18, 24, and 25 is a relative term that "renders the claim indefinite. The term 'longer length' is not defined by the claim, the specification does not provide a standard to ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention." Moreover, the Office Action contends that it is "unclear what the 'segmentation having a longer length' is to be longer than. It is unclear whether a segment having a longer length than the original phrasal string are assigned a lower cost, or if a segment having a longer length than another shorter segment is assigned a lower cost, while the shorter segment is assigned a higher cost."

In response, the Applicants respectfully traverse these rejections. In particular, the Applicants believe that the specification indicates that a sub-string having a longer length than another shorter sub-string is assigned a lower cost, while the shorter sub-string is assigned a higher cost. For example, the specification, at paragraph 0063, states that:

"[I]n order to determine the cost of correcting a segmentation, matches having a longer lengths are favored. The present invention implements this by using a length-adjusted distance measure. If  $\text{distance}(\text{pictures of}, \text{pictures ff}) = \text{distance}(\text{pictures}, \text{pictures}) + \text{distance}(\text{of}, \text{ff})$ , then little would be gained by having multiword phrases in the phrasal dictionary. The present invention avoids this

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problem by computing an average length-adjusted segment distance. Using standard edit distance,  $\text{distance}(\text{pictures of}, \text{pictures ff})=1$ ,  $\text{distance}(\text{pictures}, \text{pictures})=0$  and  $\text{distance}(\text{of}, \text{ff}) = 1$ . However, using the average length-adjusted segment distance,  $\text{distance}(\text{pictures of}, \text{pictures ff})=1/11$ , and  $\text{distance}(\text{pictures}, \text{pictures}) + \text{distance}(\text{of}, \text{ff}) = 0/8 + 1/2$ . Thus, the longer match is rewarded and assigned a lower cost."

However, in an attempt to further and expedite the prosecution of this application, the Applicants have amended claims 1, 11, 18, 24 and 25 to further clarify that sub-strings having a longer length than another shorter sub-string is assigned a lower cost, while the shorter sub-string is assigned a higher cost.

Based on these amendments, the Applicants respectfully submit that the rejections of claims 1, 3-5, 7-10, 25, and 27 under 35 U.S.C. § 112, second paragraph, as being indefinite has been overcome. The Applicants, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 1, 3-5, 7-10, 25, and 27 under 35 U.S.C. § 112, second paragraph, as being indefinite

#### Section 103(a) Rejections

The Office Action rejected claims 1, 3-5, 7-10, 25, and 27 under 35 U.S.C. § 103(a) as being unpatentable over a paper by Eric Brill and Robert C. Moore entitled "An Improved Error Model for Noisy Channel Spelling Correction" (hereinafter Brill et al.) and further in view of Califano et al. (U.S. Patent No. 5,577,249). The Office Action stated that Brill et al. disclose all elements of the Applicants' claimed invention except that Brill et al. "fails to specifically disclose length-based computation where a longer length is preferable." However, the Office Action stated that Califano et al. "disclose the use of a length-based similarity test (column 2, lines 1-16). Here, the similarity test is based upon length. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to have combined Brill's method of assigning cost for determining a most probably correct spelling, with Califano's method of treating longer substrings as more preferable, since it would have allowed a user to quickly eliminate candidate

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segments (Califano: column 2, lines 1-16)."

In response, the Applicants respectfully traverse these rejections based on the amendments to claims 1 and 25, and the following legal and technical analysis. It is the Applicants' position that the combination of Brill et al. and Califano et al. is lacking at least two material features of the Applicants' claimed invention. In particular, the combination of Brill et al. and Califano et al. does not disclose, either explicitly or implicitly, the material claimed features: (1) of adding a cost for each sub-string in a segmentation to arrive at a total cost for that segmentation, wherein a sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost; and (2) that sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost. Further, the combination of Brill et al. and Califano et al. fails to appreciate the advantages of these claimed features. Thus, the Applicants' submit that the combination of Brill et al. and Califano et al. cannot make obvious these claimed features of the Applicants' invention.

To make a prima facie showing of obviousness, all of the claimed features of an Applicant's invention must be considered, especially when they are missing from the prior art. If a claimed feature is not disclosed in the prior art and has advantages not appreciated by the prior art, then no prima facie showing of obviousness has been made. The Federal Circuit Court has held that it was an error not to distinguish claims over a combination of prior art references where a material limitation in the claimed system and its purpose was not taught therein. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Moreover, as stated in the MPEP, if a prior art reference does not disclose, suggest or provide any motivation for at least one claimed feature of an Applicants' invention, then a prima facie case of obviousness has not been established (MPEP § 2142).

#### Amended Independent Claim 1

Amended independent claim 1 of the Applicants' claimed invention includes a

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method for spelling correction of a phrasal string. The method includes segmenting the phrasal string into a plurality of different segmentations, the plurality of different segmentations including contiguous sub-strings over the phrasal string, and using dictionary looping to spell correct each of the plurality of different segmentations. The method also includes determining a cost associated with each of the sub-strings in each of the plurality of different segmentations, each of the contiguous sub-strings containing a plurality of words. The method further includes identifying a segmentation having a lowest total cost corresponding to a most probable correct spelling of the phrasal string by adding a cost for each of the sub-strings of a segmentation to arrive at a total cost for that segmentation. A sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost.

#### Amended Independent Claim 25

Amended independent claim 25 of the Applicants' claimed invention includes a method for spelling correction of a misspelled phrasal string containing words, spaces and characters. The method includes dividing the misspelled phrasal string into a plurality of different segmentations containing sub-strings containing a plurality of words, performing dictionary looping of a trie containing a phrasal dictionary to search for each of the sub-strings in the trie, and comparing each of the sub-strings to entries in the trie to find a closest match between a sub-string and a dictionary entry to determine a cost for each of the sub-strings. The method further includes summing the cost for each sub-string in a segmentation to determine a total cost for the segmentation, and constructing a corrected phrasal string using a segmentation having the lowest total cost, wherein a sub-string having a longer length is assigned a lower cost than other sub-strings having a shorter length, while the other sub-strings having a shorter length are assigned a higher cost.

The phrasal string being corrected is divided into a plurality of different segmentations (specification, paragraph 0044, lines 6-8). Each of these segmentations includes sub-strings (specification, paragraph 0044, lines 8-9). Each sub-string is matched with an entry in a phrasal dictionary, and, based on the match, a cost is found for correcting that sub-string (specification, paragraph 0045, lines 9-11). The "cost for each

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sub-string is added to arrive at a total cost for the segmentation" (specification, paragraph 0045, lines 11-12).

When determining "the cost of correcting a segmentation, matches having a longer length are favored" (specification, paragraph [0063], lines 1-2). The Applicants' claimed invention achieves this by "computing an average length-adjusted segment distance" (specification, paragraph [0063], lines 5-6). If the Applicants' claimed invention did not have this feature, then "little would be gained by having multiword phrases in the phrasal dictionary" (specification, paragraph [0063], lines 4-5). However, the "present invention avoids this problem by computing an average length-adjusted segment distance" (specification, paragraph [0063], lines 5-6). For example, using "standard edit distance, distance(pictures of, pictures ff)=1, distance(pictures,pictures)=0 and distance(of,ff) = 1. However, using the average length-adjusted segment distance, distance(pictures of, pictures ff)=1/11, and distance(pictures,pictures) + distance(of,ff) = 0/8 + 1/11. Thus, the longer match is rewarded and assigned a lower cost" (specification, paragraph [0063], lines 6-10).

In contrast, Brill et al. uses a standard edit distance. In particular, when training the model, the letters in  $s_i$  are aligned with the letters in  $w_i$  based on minimizing the edit distance (Brill et al., page 3, Section 3 ("Training the Model"), first paragraph to page 4, line 1). In other words, Brill et al. do not take into account the segmentation length when assigning a cost. The Applicants' claimed feature of segmentations having a longer length being assigned a lower cost is missing from Brill et al.

The Office Action maintained that Califano et al. disclose the Applicants' claimed feature of a sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost. However, Califano et al. merely discloses a length-based test that determines whether two strings are similar enough to warrant an in-depth comparison (col. 2, lines 1-4). The similarity is determined by comparing a pair of identical-length sub-strings (or MSP) to a threshold (col. 2, lines 4-8). If the pair is above the threshold, then "a more complete and costly similarity analysis

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is performed" (col. 2, lines 8-10). However, although Brill et al. discusses cost, and Califano et al. discusses that it is more desirable to have a longer similar sub-strings, nowhere does either paper suggest, either explicitly or implicitly, the Applicants' claimed feature that a sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost. Califano et al. merely describe that longer sub-strings having identical length are more desirable.

In addition, neither Brill et al. nor Califano et al. disclose the Applicants' claimed feature of adding (or summing) a cost for each of the sub-strings of a segmentation to arrive at a total cost for that segmentation. Consequently, no motivation or suggestion for these claimed features of the Applicants' invention is provided. Absent this teaching, motivation or suggestion, the combination of Brill et al. and Califano et al. cannot render the Applicants' claimed invention obvious (MPEP § 2143.01).

The combination of Brill et al. and Califano et al. also both fail to appreciate or recognize the advantages of the Applicants' claimed features. More specifically, if standard edit distance was used, "then little would be gained by having multiword phrases in the phrasal dictionary" (specification, paragraph [0063], lines 4-5). The advantage, therefore, of the Applicants' claimed features, is that the multiword phrases can be corrected as easily as single word. This is because the "longer match is rewarded and assigned a lower cost" (specification, paragraph [0063], line 10). Neither Brill et al. nor Califano et al. discuss or appreciate these advantages of the Applicants' claimed features discussed above.

The Applicants, therefore, submit that obviousness cannot be established since the combination of Brill et al. and Califano et al. fails to teach, disclose, suggest or provide any motivation for the Applicants' claimed features: (1) of adding a cost for each sub-string in a segmentation to arrive at a total cost for that segmentation, wherein a sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost; and (2) that sub-string having a longer length than another shorter sub-string is assigned a lower cost while the

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shorter sub-string is assigned a higher cost. In addition to explicitly lacking this feature, the combination of Brill et al. and Califano et al. also fails to implicitly disclose, suggest, or provide motivation for this feature. Further, the combination of Brill et al. and Califano et al. fails to appreciate advantages of these claimed features.

Therefore, as set forth in *In re Fine* and MPEP § 2142, the combination of Brill et al. and Califano et al. does not render the Applicants' claimed invention obvious because the references are missing at least two material features of the Applicants' claimed invention. Consequently, because a prima facie case of obviousness cannot be established due to the lack of "some teaching, suggestion, or incentive supporting the combination", the rejection must be withdrawn. ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984); MPEP 2143.01.

Accordingly, the Applicants respectfully submit that amended independent claims 1 and 25 are patentable under 35 U.S.C. § 103(a) over Brill et al. and further in view of Califano et al. based on the amendments to claims 1 and 25, and the legal and technical arguments set forth above and below. Moreover, claims 3-5 and 7-10 depend from amended independent claim 1, and claim 27 depends from amended independent claim 25, and are also nonobvious over Brill et al. in view Califano et al. (MPEP § 2143.03). The Applicants, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 1, 3-5, 7-10, 25, and 27.

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The Office Action rejected claims 11-24 under 35 U.S.C. § 103(a) as being unpatentable over Brill et al. in view of Birman et al. (U.S. Patent No. 6,616,704), and further in view of Califano et al. The Office Action stated that Brill et al. disclose all elements of the Applicants' claimed invention except that Brill et al. do "not specifically disclose the method wherein the phrasal string contains a plurality of words." However, the Office Action stated that Birman et al. disclose "the method wherein a phrasal string contains a plurality of words (column 2, lines 54-67: Here, a phrasal string that contains

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more than one word is spell checked though looping through the phrase until each word has been corrected)." Also, the Office Action stated that Brill et al. and Birman et al. "fails to specifically disclose length-based computation where a longer length is preferable." However, the Office Action stated that Califano et al. disclose this feature.

In response, the Applicants respectfully traverse these rejections based on the amendments to claims 11, 18, and 24, and the following legal and technical analysis. It is the Applicants' position that the combination of Brill et al., Birman et al., and Califano et al. is lacking at least two material features of the Applicants' claimed invention. In particular, the combination of Brill et al., Birman et al., and Califano et al. does not disclose, either explicitly or implicitly, the material claimed features: (1) of adding a cost for each sub-string in a segmentation to arrive at a total cost for that segmentation, wherein a sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost; and (2) that sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost. Further, the combination of Brill et al., Birman et al., and Califano et al. fails to appreciate the advantages of these claimed features. Thus, the Applicants' submit that the combination of Brill et al., Birman et al., and Califano et al. cannot make obvious these claimed features of the Applicants' invention.

#### Amended Independent Claim 11

Amended independent claim 11 of the Applicants' claimed invention includes a method for spelling correction of a misspelled phrasal string containing words, spaces and characters. The method includes receiving the misspelled phrasal string, dividing the misspelled phrasal string into a plurality of segmentations containing sub-strings having a plurality of words, and comparing each of the of the sub-strings in each of the plurality of segmentations to entries in a dictionary to obtain a cost for each of the sub-strings. The method further includes determining a best segmentation from the plurality of segmentations that represents the most probable correct spelling of the misspelled phrasal string by adding together the cost of each of the sub-strings for a segmentation to obtain a



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total cost for the segmentation. The best segmentation has a lowest total cost, and a sub-string having a longer length when compared to another sub-strings is assigned a lower cost while the other sub-strings having a shorter length are assigned a higher cost.

#### Amended Independent Claim 18

Amended independent claim 18 of the Applicants' claimed invention includes a phrasal spelling correction system for spelling correction of a phrasal string. The system includes a segmentation module that divides the phrasal string into a plurality of segmentations, each of the plurality of segmentation containing sub-strings containing a plurality of words. The system also includes a looping comparator that performs dictionary looping to correct a segmentation by looping through a dictionary and comparing each of the sub-strings of the segmentation with entries in the dictionary to determine a closest match and a cost for each of the sub-strings and adds the cost of each sub-string to arrive at a total cost for the segmentation. The system further includes an output string containing a corrected segmentation having the lowest total cost that represents a correct spelling of the phrasal string. A sub-string having a longer length than other sub-strings is assigned a lower cost over the other sub-strings having a shorter length, while the other sub-strings having a shorter length are assigned a higher cost.

#### Amended Independent Claim 24

Amended independent claim 24 of the Applicants' claimed invention includes a method for spelling correction of a phrasal string. The method includes segmenting the phrasal string into a plurality of different segmentations containing sub-strings having a plurality of words, and using dictionary looping to perform a plurality of different searches through a dictionary data structure such that each of the different searches begins at a starting node and continually loops back to the starting node to begin another search in order to compare each of the sub-strings with entries in the dictionary data structure to assign a cost to each of the sub-strings. The method further includes determining a cost for correction associated with each of the plurality of different segmentations by adding a cost of each of the sub-strings of a segmentation to arrive at the cost of correction. A sub-string having a longer length is assigned a lower cost as compared to other sub-strings

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having a shorter length. The method also includes identifying a segmentation having a lowest cost of correction corresponding to a most probable correct spelling of the phrasal string.

As noted above, Brill et al. merely uses a standard edit distance that does not take into account the segmentation length when assigning a cost. Moreover, neither Brill et al. nor Califano et al. discuss, either explicitly or implicitly, the Applicants' claimed feature that a sub-string having a longer length than another shorter sub-string is assigned a lower cost while the shorter sub-string is assigned a higher cost. In addition, neither Brill et al. nor Califano et al. disclose the Applicants' claimed feature of adding (or summing) a cost for each of the sub-strings of a segmentation to arrive at a total cost for that segmentation.

Moreover, Birman et al. add nothing to the cited combination that would render the Applicants' claimed invention obvious. Birman et al. merely disclose a method that uses a standard edit distance to determine a cost. In particular, Birman et al. teach that " $\Delta$  is the maximal edit distance for determining whether a candidate word is acceptable; i.e., if the edit distance between G and a candidate word C exceeds  $\Delta$ , then C is unacceptable" (Birman et al., col. 1, lines 64-67). Consequently, no motivation or suggestion for the claimed features of the Applicants' invention is provided. Absent this teaching, motivation or suggestion, Birman et al. cannot render the Applicants' claimed invention obvious (MPEP § 2143.01).

The combination of Brill et al., Califano et al., and Birman et al. also fails to appreciate or recognize the advantages of the Applicants' claimed features. More specifically, if standard edit distance was used, "then little would be gained by having multiword phrases in the phrasal dictionary" (specification, paragraph [0063], lines 4-5). The advantage, therefore, of the Applicants' claimed features, is that the multiword phrases can be corrected as easily as single word. This is because the "longer match is rewarded and assigned a lower cost" (specification, paragraph [0063], line 10). Neither Brill et al., Califano et al., nor Birman et al. discuss or appreciate these advantages of the Applicants' claimed features discussed above.

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Therefore, as set forth in *In re Fine* and MPEP § 2142, the combination of Brill et al., Califano et al., and Birman et al. does not render the Applicants' claimed invention obvious because the references are missing at least two material features of the Applicants' claimed invention. Consequently, because a prima facie case of obviousness cannot be established due to the lack of "some teaching, suggestion, or incentive supporting the combination", the rejection must be withdrawn. ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984); MPEP 2143.01.

Accordingly, the Applicants respectfully submit that amended independent claims 11, 18, and 24 are patentable under 35 U.S.C. § 103(a) over Brill et al. in view of Birman et al. and further in view of Califano et al. based on the amendments to claims 11, 18, and 24, and the legal and technical arguments set forth above and below. Moreover, claims 12-17 depend from amended independent claim 11, and claims 19-23 depend from amended independent claim 24, and are also nonobvious over Brill et al. in view of Birman et al. and further in view of Califano et al. (MPEP § 2143.03). The Applicants, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 11-24.

#### Conclusion

In view of the amendments to claims 1, 11, 18, 24, and 25, and the arguments set forth above, the Applicants submit that claims 1, 3-5, 7-25, and 27 of the subject application are in condition for immediate allowance. The Examiner, therefore, is respectfully requested to withdraw the outstanding rejections of the claims and to pass this application to issue.

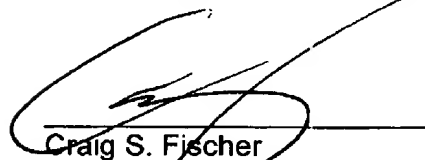
In an effort to expedite and further the prosecution of the subject application, the Applicants kindly invite the Examiner to telephone the Applicants' attorney at (805) 278-8855 if the Examiner has any comments, questions or concerns, wishes to discuss any aspect of the prosecution of this application, or desires any degree of clarification of this

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response.

Respectfully submitted,  
Dated: December 15, 2005



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